

# Numerical study of the airflow over clearings

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In forest stands, clear-cut areas of different geometry can be found. They are induced by tracks, roads, intersections or they are created by lumbering, forest fires or severe storms. Such clearings represent a discontinuity in the forest canopy causing the atmospheric flow to 'stumble' and to induce mean wind and turbulent perturbations. Thus, clearings can influence the stability of the forest stand. However, there is still a lack of knowledge in order to assess the fluid mechanics involved.

In order to better understand the flow over clearings, a numerical study was performed in which two-dimensional clearings of different width as well as three-dimensional clearings of different shape have been investigated. For the study, a software package based on the standard k- turbulence model was used (FLOVENT/Flomerics Ltd.). The forest stands were simulated by highly porous and homogenous bodies characterized by flow resistances (via pressure loss coefficients).

The results will be presented in isoplots of mean and turbulent flow data and in vector plots. Computed animations will be displayed.

The validation of the numerical data is performed against the wind-tunnel data of ZASCHKE 2006, who modeled a forest as a simple cuboid of highly permeable foam with known pressure loss coefficient.

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Fig.: Flow field over two forest stands separated by a clearing

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